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MARINE LABORATORIES, AND OUR ATLANTIC COAST

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WE are fortunate above all civilized nations in having in the range of our Atlantic sea-board a unique diversity of conditions affecting marine life. The arctic current creeps down the northern New England coast to Cape Cod, and during the winter the strong northeasterly winds drive its cold waters southward to the mouth of the Chesapeake. In summer, however, the southerly winds reverse these conditions, and the warm surface waters from the Gulf stream are drifted upon the shores between Cape Hatteras and the southern side of Cape Cod.

Another well-marked region is that between Cape Hatteras and Cape Canaveral, Florida, where we find a very characteristic warm-water fauna, which is again distinct from that of the coral reef region of Florida, south of Miami.

Thus, broadly speaking, there are four well-marked faunistic regions along our coast, and each affords its own peculiar problems for research. A mainly arctic fauna is found from northern Maine to Cape Cod, a transitional and seasonally fluctuating fauna from the southern coast of New England to Cape Hatteras, creatures of a warm sea from Cape Hatteras to Cape Canaveral, Florida, and a strictly tropical colony from Biscayne Bay, Florida, southward.

The physical features of the coast itself are also most important in determining the character of the animals of the shore. Thus the rocky wave-worn ledges of the coast of Maine, the varied character of that of southern New England, the monotonous stretch of shifting sand be-

tween Sandy Hook and Cape Canaveral, and the coral reefs of Florida, have each their own peculiar fauna and impose their own limitations upon the diversity of animal life. A diversity which is accentuated by the fact that in Florida we find a tidal rise and fall of less than two whereas in northern Maine the diurnal range is more than thirty feet.

Moreover, the relatively brackish and protected waters, such as those of Long Island, Pamlico and Albemarle Sounds, Chesapeake and Delaware Bays, and the tortuous estuaries and salt-water creeks of the Carolinas and northern Florida, have faunæ differing widely from those of the more richly endowed outer sea-beaches.

It is therefore evident that in so far as research is concerned no one biological laboratory can grant facilities other than those limited by the conditions of its own locality. The purposes of research demand that we establish a series of stations at salient points from Maine to southern Florida.

On the other hand, the successful prosecution of research demands that our youth be trained to its performance, and to this end it is essential that certain of the more centrally situated laboratories should devote some part of their energies to the giving of primary instruction.

Such instruction should, I believe, be given only in those laboratories which are placed near large centers affording the advantages of accessibility and diversity of intellectual interests. On the other hand, a certain remoteness from the busy world and consequent freedom from interruption is peculiarly favorable to the conduct of research, and it is interesting to observe that the only laboratory, along our coast, devoted exclusively to research is placed upon the most inaccessible island along the entire range from Maine to Florida.

At present we find one laboratory at South Harpswell, Casco Bay, Maine, a great center at Woods Holl, another at Cold Spring Harbor, in Long Island Sound, another

at Beaufort, North Carolina, and one at the extreme westerly and southerly end of the Florida Keys.

No laboratory has as yet been established along the interesting coast between Hatteras and Sandy Hook, with its peculiar transitional fauna; yet such situations as Cape May, or Linhaven, or Willoughby Harbors in Hampton Roads, would afford a suitable site for such a station.

It is not so remarkable that no laboratories have been established upon the inner shores of Delaware or Chesapeake Bays, or at Pamlico or Albemarle Sounds, for in these brackish inland waters the fauna is but limited in comparison with the rich variety of forms to be found along the exposed sea-beaches. In future, indeed, we should endeavor to avoid the error which has, in places, been made of building our laboratories in situations from which the open water is not readily accessible at all times, for it is peculiarly true of every laboratory that the animals which afford the subjects of its most significant researches are invariably those which may be obtained in abundance in the near neighborhood of the station itself. It is, therefore, most desirable that the laboratory be placed in close proximity to the richest collecting grounds of the region.

It is remarkable that so little effort has been made to properly install a laboratory for general instruction and research upon the coast of New England north of Cape Cod Bay. Yet here we find one of the most sharply differentiated of the faunistic divisions of our coast. The welfare of research in marine biology demands the adequate maintenance of such a station.

Returning recently from a visit of half a year to various biological centers in Europe the writer has formed the impression that the scientific results which have been achieved by investigators in our marine laboratories have won the admiration of European students, while at home our intelligent public is only beginning to awaken to the fact that they are worthy of respect.

In America, however, we may consider it fortunate that in order to win that form of recognition which leads to advancement in material as well as in intellectual well-being, it is necessary that our institutions of learning should attract the respectful interest of broad minded men of culture who are also leaders in the great affairs of the commercial world. Much may be learned by those desirous of furthering the already superior work of our laboratories, through a study of the methods of management of the great museums of New York City. Certain it is that the direction of any successful laboratory demands a two-fold capacity. On the one hand, we face a problem of expenditure and receipts, and on the other hand, a dependent but widely different problem of the scientific scope and aim of the institution. A neglect to attain to excellence of management from the purely commercial standpoint, must react unfavorably upon the ability of the institution to attain toward the realization of its proper ideals in scientific achievement. It appears to the writer that our institutions of learning which are dependent upon the public for support owe it as a duty to publish annually a clear, detailed and perfectly intelligible financial statement. Surely funds devoted to the giving of instruction or the prosecution of research can not be too carefully accounted for or too wisely expended.

It is unfortunate that throughout the length of our great Atlantic seaboard there is no situation well suited to the establishment of a marine laboratory which may remain active throughout the year. In winter the frozen harbors of the north, the relative inaccessibility and desolation of the Carolina shores, the hurricane season of Florida interpose practical barriers to the plan of maintaining any one of our stations constantly open. We have no Naples with its brilliant bay, its genial climate, and over it as a veil the association of history deepening every charmed impression of its beauty.